

What is claimed is:

1. A vertical cavity surface emitting laser (VCSEL), comprising:

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at least one quantum well having a depth of at least 40 meV and comprised of InGaAsN;

10 barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said barrier layers.

2. The VCSEL of claim 1 wherein said barrier layers are comprised of GaAsN barrier layers.

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3. The VCSEL of claim 1 wherein said confinement layers are comprised of AlGaAs.

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4. The VCSEL of claim of claim 1 wherein said barrier layers are

comprised of AlGaAs.

5. The VCSEL of claim 1 wherein said at least one quantum well is further comprised of >1% N.

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6. The VCSEL of claim 1 wherein said quantum well is up to and including 50 Å in thickness.

7. The VCSEL of claim 5 wherein said quantum well is up to and including 50 Å in thickness.

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8. The VCSEL of claim 5 wherein said barrier layers are comprised of GaAsN barrier layers.

9. The VCSEL of claim 5 wherein said confinement layers are comprised
5 of AlGaAs.

10. The VCSEL of claim of claim 7 wherein said barrier layers are comprised of AlGaAs.

11. The VCSEL of claim 8 wherein said confinement layers are comprised of AlGaAs.

12. The VCSEL of claim 5 wherein said barrier layers are comprised of AlGaAs.

13. The VCSEL of claim 12 wherein said confinement layers are comprised of AlGaAs.

14. The VCSEL of claim 1 wherein said at least one quantum well is
20 further comprised of Sb.

15. The VCSEL of claim 14 wherein said barrier layers are comprised of GaAsN barrier layers.

25 16. The VCSEL of claim 14 wherein said confinement layers are comprised of AlGaAs.

17. The VCSEL of claim of claim 16 wherein said barrier layers are comprised of AlGaAs.

18. The VCSEL of claim 15 wherein said confinement layers are comprised of AlGaAs.

19. The VCSEL of claim 14 wherein said barrier layers are comprised of
5 AlGaAs.

20. The VCSEL of claim 19 wherein said confinement layers are comprised of AlGaAs.

10 21. A vertical cavity surface emitting laser (VCSEL), comprising:

at least one quantum well having a depth of at least 40 meV and comprising InGaAsN;

15 AlGaAs barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said barrier layers.

22. The VCSEL of claim 21 wherein said confinement layers are
20 comprised of AlGaAs.

23. The VCSEL of claim 21 wherein said quantum well is up to and including 50 Å in thickness.

25 24. A vertical cavity surface emitting laser (VCSEL), comprising:

at least one quantum well having a depth of at least 40 meV and comprising InGaAsN;

30 barrier layers sandwiching said at least one quantum well; and

AlGaAs Confinement layers sandwiching said barrier layers.

25. The VCSEL of claim 24 wherein said barrier layers are comprised of
5 AlGaAs.

26. The VCSEL of claim 24 wherein said barrier layers are comprised of
InGaAsN.

10 27. The VCSEL of claim 24 wherein said quantum well is up to and
including 50 Å in thickness.

15 28. A vertical cavity surface emitting laser (VCSEL), comprising:
at least one quantum well comprising InGaAsN;

15 AlGaAs barrier layers sandwiching said at least one quantum well; and

AlGaAs Confinement layers sandwiching said barrier layers.

20 29. A vertical cavity surface emitting laser (VCSEL), comprising:
at least one quantum well comprising InGaAsN;

InGaAsN barrier layers sandwiching said at least one quantum well; and

25 AlGaAs Confinement layers sandwiching said barrier layers.

30 30. A vertical cavity surface emitting laser, comprising:

at least one quantum well comprised of InGaAsN;

GaAsN barrier layers sandwiching said at least one quantum well; and

GaAsN confinement layers sandwiching said barrier layers.

5 31. A vertical cavity surface emitting laser, comprising:

at least one quantum well comprised of InGaAsN;

10 AlGaAs barrier layers sandwiching said at least one quantum well; and

AlGaAs confinement layers sandwiching said barrier layers.

15 32 35. A vertical cavity surface emitting laser, comprising:

at least one quantum well comprised of InGaAsN;

20 GaAsN barrier layers sandwiching said at least one quantum well; and

AlGaAs confinement layers sandwiching said barrier layers.

25 33 36. A vertical cavity surface emitting laser, comprising:

at least one quantum well comprised of InGaAsN;

25 AlGaAs barrier layers sandwiching said at least one quantum well; and

GaAsN confinement layers sandwiching said barrier layers.